

INT 34 AMDT

1 CLAIMS

2

3 1. A hydraulically activated downhole tool for use in
4 a well bore comprising:
5 a hydraulically operated tool including a
6 hydraulically operating mechanism controlled by
7 fluid pressure; and
8 a control sub comprising a tubular assembly having
9 a through passage between an inlet and a first
10 outlet, the inlet being adapted for connection on a
11 workstring, the first outlet being adapted for
12 connection to the hydraulically operated tool, one
13 or more radial outlets extending generally
14 transversely of the tubular assembly, an obturating
15 member moveable between a first position permitting
16 fluid flow through the one or more radial outlets
17 and a second position closing the one or more
18 radial outlets,
19 wherein the obturating member is moved from the
20 first position to the second position by a
21 compressive force applied from the hydraulically
22 operated tool; and
23 movement of the obturating member regulates the
24 fluid pressure from the first outlet to
25 hydraulically control the hydraulically operated
26 tool.

27

28 2. A hydraulically activated downhole tool as claimed
29 in Claim 1 wherein a cross-sectional area of the
30 first outlet is greater than a cross-sectional area
31 of the second outlet.

32

33

- 1 3. A hydraulically activated downhole tool as claimed
2 in Claim 1 or Claim 2 wherein the compressive
3 force occurs from the hydraulically operated tool
4 remaining static relative to movement of the
5 workstring and the control sub.
6
- 7 4. A hydraulically activated downhole tool as claimed
8 in any preceding Claim wherein the tubular assembly
9 comprises an inner sleeve and an outer sleeve,
10 sealingly engaged to each other.
11
- 12 5. A hydraulically activated downhole tool as claimed
13 in Claim 4 wherein the outer sleeve is adapted to
14 connect to the workstring and the inner sleeve is
15 adapted to connect to the hydraulically operated
16 tool.
17
- 18 6. A hydraulically activated downhole tool as claimed
19 in Claim 4 or Claim 5 wherein the inner and outer
20 the sleeves include mutually engageable faces so
21 that the sleeves may be axially slideable in
22 relation to each other over a fixed distance.
23
- 24 7. A hydraulically activated downhole tool as claimed
25 in any one of Claims 4 to 6 wherein the obturating
26 member is a sleeve, coupled to the inner sleeve of
27 the tubular assembly.
28
- 29 8. A hydraulically activated downhole tool as claimed
30 in any one of Claims 4 to 7 wherein the one or more
31 radial ports are located on the outer sleeve.
32
33

- 1 9. A hydraulically activated downhole tool as claimed
2 in Claim 8 wherein matching radial ports are
3 located on the obturating member such that under
4 compression each set of radial ports align to allow
5 fluid to flow radially from the sub.
6
- 7 10. A hydraulically activated downhole tool as claimed
8 in any one of Claims 4 to 9 wherein an outer
9 surface of the inner sleeve includes a portion
10 having a polygonal cross-section and an inner
11 surface of the outer sleeve has a matching
12 polygonal cross-section.
13
- 14 11. A hydraulically activated downhole tool as claimed
15 in Claim 10 wherein the polygonal cross sections
16 are hex cross-sections.
17
- 18 12. A hydraulically activated downhole tool as claimed
19 in any preceding Claim wherein the sub includes an
20 indexing mechanism.
21
- 22 13. A hydraulically activated downhole tool as claimed
23 in Claim 12 wherein the indexing mechanism
24 comprises mutually engageable formations on the
25 inner and outer sleeves.
26
- 27 14. A hydraulically activated downhole tool as claimed
28 in Claim 13 wherein the engageable formations
29 comprise at least one pin and a slot into which the
30 pin(s) engage.
31
- 32 15. A hydraulically activated downhole tool as claimed
33 in Claim 14 wherein the slot extends

AMENDED

- 1 circumferentially around a surface of a sleeve to
2 provide a circumferential path for the pin.
3
- 4 16. A hydraulically activated downhole tool as claimed
5 in Claim 15 wherein the slot includes one or more
6 longitudinal profiles as offshoots from the
7 circumferential path to allow the sleeves to move
8 relative to each other to effect the relocation of
9 the obturating member from one position to another.
10
- 11 17. A hydraulically activated downhole tool as claimed
12 in any preceding Claim wherein the hydraulically
13 operated tool is an expander tool.
14
- 15 18. A method of controlling a hydraulically activated
16 downhole tool in a well bore, the method comprising
17 the steps:
18
- 19 (a) mounting a work string, a hydraulically
20 activated downhole tool having a hydraulically
21 operated tool including a hydraulically operating
22 mechanism controlled by fluid pressure, and a
23 control sub, the sub including a first outlet to the
24 hydraulically operated tool and one or more radial
25 outlets through which fluid within the workstring
26 will flow when not obstructed by an obturating
27 member, the obturating member being moveable under a
28 compressive force from the hydraulically operated
29 tool;
30
- 31 (b) running the hydraulically activated downhole
32 tool into a well bore and locating the hydraulically
33 operated tool on a formation in the well bore;

KT 34 ANDT

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33

(c) compressing the control sub by setting down weight on the hydraulically operated tool;

(d) using the compressive force to move the obturating member and thereby control the fluid flow through the radial outlets, regulating the fluid pressure from the first outlet to hydraulically control the hydraulically operated tool and thereby control the hydraulically activated tool.

19. A method as claimed in Claim 18 wherein the method includes the step of running the hydraulically activated tool in the well bore with the radial outlets in an open position and circulating fluid within the well bore.

20. A method as claimed in Claim 18 or Claim 19 wherein the method includes the steps of picking up and setting down the weight of the string repeatedly to cycle opening and closing of the radial outlets and thus provide a selective continuous 'on' and 'off' operation of the hydraulically activated tool.

21. A method of expanding a pipe within a casing of a well bore, the method comprising the steps:

(a) mounting a work string, a hydraulically activated downhole tool having an expander tool controlled by hydraulic fluid pressure, and a control sub, the sub including a first outlet to the hydraulically operated tool and one or more radial outlets through which fluid within the workstring

1 will flow when not obstructed by an obturating
2 member, the obturating member being moveable under a
3 compressive force from the hydraulically operated
4 tool;

5
6 (b) running the hydraulically activated downhole
7 tool into a well bore and locating the expander tool
8 on the pipe;

9
10 (c) compressing the control sub by setting down
11 weight on the expander tool;

12
13 (d) using the compressive force to move the
14 obturating member and thereby prevent fluid flow
15 through the radial outlets;

16
17 (e) pressuring up the expander tool by fluid
18 pressure from the first outlet; and

19
20 (f) expanding the pipe using the expander tool at a
21 constant fluid pressure while maintaining the
22 compressive force on the sub.

23
24 22. A method as claimed in Claim 21 wherein the method
25 includes the step of running the hydraulically
26 activated tool in the well bore with the radial
27 outlets in an open position and circulating fluid
28 within the well bore.

29